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DESIGN AND CONSTRUCTION OF ELECTRONIC SECURITY SYSTEM FOR AQUACULTURE WATER - RECIRCULATORY SYSTEM

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ABSTRACT

Electronic play a vital role in providing security. A security alarm system was designed and constructed to safeguard aquaculture water recirculatory system against illegal entry. The system involved a laser touch which is easily available and it is used for the operation of the device. The laser beam is directed across the entrance to the water recirculatory system, falling on a light dependant resistor (L.D.R). Any unwanted interruption of the laser beam would result into energization of the alarm and indicating security danger. A prototype water recirculatory system was constructed and interfaced with the devices and the device was found efficient and reliable.

Keywords: Electronic, Security alarm, Laser beam, Water recirculatory system.

INTRODUCTION

The early pioneers of electronics and telecommunication devices would surely be surprised to see the varieties of application of modern electronic engineering today. Lynn (1986), affirms that electronics can measure, detect, control, process, and communicate signals. It does all these things clearly, quietly, and very quickly. In the same vein, Dennis (1982) stated that whatever major field of societal activity or world industry is selected, it would be found that electronic devices play an increasingly dominant role in processing, communication….and security. Cubb (1996) stated that security means freedom from risks and dangers. Therefore, for need for security device in the hatchery complex cannot be over emphasized. The followings are the reasons why security alarm system is very important in the hatchery complex.

(i) Fish hatchery complex function as egg development centre that need certain percentage of silence and constant monitoring of phases of eggs development. Unwanted persons should not be allowed to parade the area.

(ii) Operation and monitoring entails some basic skills and knowledge, so unskilled persons should not be allowed.

(iii) When studying genetically improved stages (hybridization) about a particular species of fish, it requires a period of silence, without which adequate and proper result will not be obtained.

However, the purposes of this work are to design and construct a portable security device to safeguard hatchery complex against unauthorized persons, and activate a warning device upon detection of intrusion. TBFAA (2009) maintained that one way to combat burglary is to hire security guards. But human guards are susceptible to errors and human weakness like fatigue, lethargy, misjudgment, and even enticement that result to inside jobs, unlike electronic alarm system which provide security for 24 hours every day. They never get tied, sleepy or bribed, they

are dependable, just need regular checking with wiring and connections.

This work is very important because established security companies sell security system for a higher price, therefore, individuals with practical experience in security technology and electricity can build their own low cost alarm system. Schools, research institutes, government department of fisheries will find this work helpful in safeguarding fish seeds against lost to burglars.

The device is simple as it works on a simple laser beam and a proper mirror arrangement around the area to be secured. By networking the laser beams through reflections of mirrors and by blowing the alarm if any one crosses the beams, indicating **"security in danger".**

MATERIALS AND METHOD

The research design is carried out under electrical and optical designs. The electrical design involves the selection of component values that will give the correct predetermined specifications for the system. The optical design involves positioning of mirrors to build a network of beams around the area to be protected. The approach used in this work is a modular approach where the overall design is first broken down into functional block diagram; each block diagram represents a section of the circuit that carries out a specific function. The block diagram and the functional circuit is shown in fig.1 and 3 respectively. See appendix.

System Components

1. I.C. 555 2. L.D.R 3. Transistor BC547, 4. Laser touch, 5. Capacitors, 6. Resistors, 7. Speaker 8. Mirrors 9. Connecting wires.

Working Operation of System

Receiver Unit and its working Description: In receiver unit IC 555 in A stable multi vibrator is used. There is continuous ON/OFF of pulses. PIN No.4 of IC 555 is RESET. ON this pin we have given O/P of transistor 547. The transistor acts as a switch to RESET.

The LDR voltage is given to base of transistor, according to which the RESET period is varied.

Working

When LASER beam falls on LDR through mirrors, the resistance of LDR is negligible. This makes 'OFF STATE'. This the O/P of IC 555 gives Low or zero voltage and speaker remains open.

As any Trespasser crosses, the LASER beam is interrupted. The resistance of LDR become large. This gives base pulse to transistor. Thus IC 555 gets RESET pulse. The O/P goes HIGH. The speaker gets closed and sound is produced. It is reset by switch.

RESULTS AND DISCUSSION

From the results in table 2, it can be observed that a little discrepancy occurs between the actual period in operation and the expected period. In percentage value, this can be expressed as $\frac{4,52}{50} \times 100 = 9.00$ %. Therefore, an overall efficiency of about 91 % was attained.

CONCLUSION

An electronic security system for hatchery water re-circulatory system was designed and constructed. The system is unique one whose control is light dependent. It was designed to safe guard hatchery complex against unauthorized entry. Furthermore, from the test carried out, an accuracy of 91 % was achieved. This achievement is deemed satisfactorily.

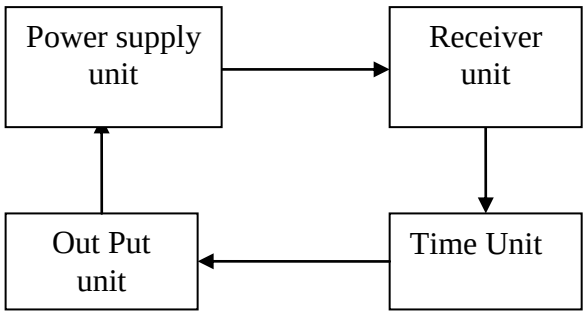
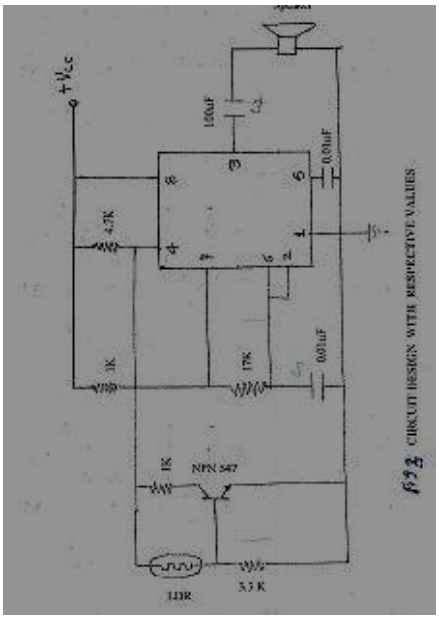


Fig 1 **block diagram of the system**



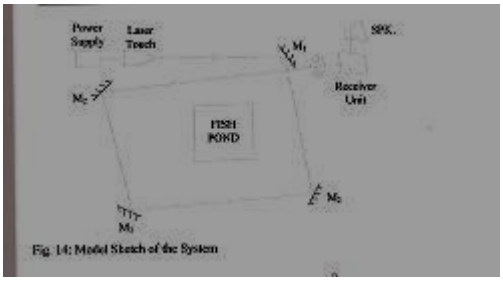


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Table 1: Table of device state illustration

LDR	Reset Pin	Speaker
Light	High	OFF
Dark	Low	ON

Table 2: Table of Results

Mode of Operation	Actual Period	Expected period	Discrepancy
Test	1.27 minutes	1.56 minutes	0.29
Operate	45,48	50 minutes	4. 52